

## SYSTEM DYNAMICS SIMULATION MODEL FOR DECISION MAKING IN RETAILER SELECTION

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**ABSTRACT:** Simulation models are becoming increasingly popular in the analysis of important policy issues including global warming, population dynamics, energy systems, and urban planning. The usefulness of these models is predicated on their ability to link observable patterns of behaviour of a system to micro-level structures. This paper argues that structural validity of a simulation model -right behaviour for the right reasons- is a stringent measure to build confidence in a simulation model regardless of how well the model passes behaviour validity tests. That leads to an outline of formal structural validity procedures available but less explored in system dynamics modelling 'repertoire'. An illustration of a set of six tests for structural validity of both system dynamics and agent-based simulation models follows. Finally, some conclusions on the increased appeal for simulation models for policy analysis and design are presented.

**Keywords:** System Dynamics. Simulation. Retailer selection.

### 1 INTRODUCTION

Vegetable retail is more dynamic as it is directly affected by consumption pattern, perishability of the products, distribution trends and its year-round availability is necessity for both foodservice and retail buyers (UVA, 2000). Global vegetable retail chains are becoming increasingly dominant in global food trade and their rise leads to dramatic impacts on agricultural supply chains and on small producers. However, the prospects and impacts of a food retail revolution in poor countries are not yet well understood. Global retail chains are increasingly spreading throughout the world, especially into developing and transition economies (REARDON; TIMMER 2005). For example, the average share of supermarkets in organised food retailing went from only 10-20% in 1990 to 50-60% by the early 2000s in most of South America, East Asia (outside China) and South Africa (REARDON et al. 2003). Dominant global vegetable retail chains evolution has significant impacts on agricultural systems and food supply chains, largely due to the insistence of global retail chains on improved quality standards (PINGALI 1995; HU et al. 2004). The instituted changes include

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procurement methods and use of specialized-dedicated wholesalers, preferred supplier, and contract forming (REARDON et al. 2003). Global retail chains do not invest uniformly in all countries and some – especially poorer – countries have been left behind in the retail revolution. In order to meet with the obstacles of market saturation and resulting competition in the home countries of most of the top food retailers, they use the chance to participate in increasing standard of living in Asia, South America and Central – and Eastern Europe. Thus, retail internationalization can be regarded as a growth strategy for top food retailers. The Indian vegetable consumers, at least the urban consumers now have a choice to select between organised and traditional vegetable retailers. Factors influencing consumers in selection of vegetable is important to assess the competitive advantages, sustainability as well as area need to be improved by the traditional vegetable retailers against organised players in the market.

## **2 LITERATURE REVIEW**

### **2.1 Global retail**

The global retail industry has travelled a long way from a small beginning to an industry where the world wide retail sales alone is valued at USD 13.9 trillion (GLOBAL RETAIL REPORT, DELOITTE TOUCHE TOHMATSU, 2010). Retail sales being generally driven by people's ability (disposable income) and willingness (consumer confidence) to buy, compliments the fact that the money spent on household consumption worldwide increased 68 per cent between 1980 and 2009. Till Last decade, more than half (53 per cent) of the top 200 retailers operate in only one country and now, only 44 per cent remain single-country merchants. These globalisation trends intensify in the years ahead. The benefits of increased sales and greater economies of scale are too large to be ignored. Saturated home markets, fierce competition and restrictive legislation have relentlessly pushed major food retailers into the globalisation mode. Since mid-1990s, numerous governments have opened up their economies as well, to free markets and foreign investment that are all advantages for many retailers.

### **2.2 Indian Retail**

India is a land of retail democracy – hundreds of thousands of weekly haats (the term 'Haat', traditionally, refers to Indian marketplace) and bazaars are located the length and breath of the country by people's own self-organisational capacities. Indian bazaars are lively, vibrant, and source of livelihood for millions. In a country with large number of people and

high levels of poverty, the existing model of retail democracy is the most appropriate in terms of economic viability (GOI, 2009). India is twelfth largest economy in the world with GDP of USD 1,170 billion, agriculture output constitutes 18 percent and trade account for 45.8 percent of GDP for the year 2008 (WORLD BANK, 2009).

Agriculture in India is the means of livelihood for almost two thirds of the workforce in the country and employs nearly 66.7 percent of the population (UNDP, 2005). Retail sector in India is estimated to account for about 10 per cent share in GDP, as compared to 8 per cent in China, 6 per cent in Brazil and 10 per cent in USA. India is estimated to have around 12 million retail outlets, making it the country with the highest retail outlet density in the world. In terms of ownership, it primarily consists of independent, owner managed shops. Retail businesses include a variety of traditional retail formats, e.g. kirana stores (mom and pop stores) where the basic necessities of life – grocery and vegetables are available.

Current retailing formats such as street carts, pavement shops, kirana store, public distribution system, and weekly markets, etc. are unique to India and have been in existence for a long time. Indian retail sector is highly fragmented in nature, only 4 per cent of Indian retail outlets are larger than 500 sq. feet. This means that India's per capita retailing space is about 2 square feet, compared to 16 square feet in the United States. India's per capita retailing space is thus the lowest in the world. Organised retail is just 5 per cent of the total retail market, whereas 95 per cent of the total retail trade in India is in the traditional (unorganised) sector. Traditional retail industry in India is the second largest employer after agriculture, employing about 8 per cent of total work force (around 40 million persons) (GOI, 2009).

Indian Retail industry is divided into organised and unorganised sectors. Organised retailing refers to trading activities undertaken by licensed retailers, that is, those who are registered for sales tax, income tax, etc. This includes corporate backed hypermarkets, retail chains, and also privately owned large retail businesses. Unorganised retailing, on the other hand, refers to the traditional formats of low-cost retailing, for example, local kirana (Mom and Pop) stores, paan/beedi (Betel Leaf Chew/Cigarette) stores, convenience stores, hand cart and pavement vendors, etc.

Now, the vast majority urban markets and whole of rural markets are served by traditional vegetable and grocery retailers. The traditional retailers are unorganised small shopkeepers whose stores are managed by families or individuals. There are two types of traditional retailer's formats; stores and non-stores. Stores formats include stores with

permanent and semi-permanent building ranging from 50 square feet or more in size; corner stores, paper and cigarette shops. Non-stores format covers street vendors, pavement vendors, cart vendors, mobile vendors (basket) and vendors at daily or weekly farmers market. Traditionally retailing of vegetables in India is not organised which amounts to 97 per cent of the total market (ERNST; YOUNG, 2006), and also extremely localized and highly fragmented with large number of intermediaries.

Indian industrial growth and liberalised economic policy attracted global players to India in every industrial sector. Retail sector in India is at crossroads today. A shift between unorganised and organised retail sector is apparent, especially in vegetable retailing zone. This shift is a call for transfer of consumerism towards organised retailing. Penetration of organised retail in the field of vegetable retailing faces fierce resistance from traditional retailers with their existing strong foothold. This resistance from the traditional vegetable retail cannot be ignored. Farthest importance is that the traditional retail format supports a larger population and provides direct employments. So there is no way that government or policy makers can discount these foundation stone of Indian economy. The role of government and its policy are vital in survive, support, improve, and develop traditional vegetable retailers.

### **2.3 Emerging organised retail in India**

Organised vegetable retailing is a very recent phenomenon in India as compared with other developing countries, though Indian retail market, which is fifth largest retail destination globally, is ranked the second most attractive emerging market for investment in the retail sector by AT Kearney's seventh annual Global Retail Development Index (GRDI, 2009). Currently, organised retailers are anchoring at metropolitan cities and urban markets. In near future, corporate retailers will concentrate on rural markets, which are uncovered and have untapped potential by the organised marketing and distribution. To attract global leaders in to retailing of vegetable, government allows foreign direct investment in cash and carry type of business model to the tune of 100 per cent equity participation. Domestic Indian companies with global players are allowed to operate as joint ventures in vegetable and grocery retail with domestic companies have controlling stack.

Consumer-oriented economy is emerging in India. Organised retailing in grocery, fresh fruits and vegetables is spreading and making its presence felt in different parts of the country. Organised retailing in India is witnessing a radical transformation. Increase in

number of retail chains across the country is an indication that organised retailing is emerging as an industry and will boom in a big way in near future. India is currently at a stage where customers needed variety in products and retail formats. At present, the contribution of organised retailing is just about five percentages to total size of USD180 billion. However, studies indicate that organised retail will grow to 20 percentages by the end of the decade and same is depicted in Table 1 Population growth combined with an increase in disposable incomes provides impetus to this boom. Research reveals that food retail is expected to grow to USD1.6 billion over the next five years. This means there is enough space for many players. Number of factors such as income growth, changing demographic profile due to more urbanisation, and socio-economic environment has its impact on retail scene. India has large number of middle class population and available high-disposable income in the age group 25-35 years is an advantageous position for organised retailers.

Table 1 – Retail outlets in India

| <b>Growth of Traditional Retail Outlets in India ('000) *</b>      |                     |                   |                        |                           |             |             |
|--|---------------------|-------------------|------------------------|---------------------------|-------------|-------------|
| <b>Outlets</b>   | <b>2004</b>         | <b>2005</b>       | <b>2006</b>            | <b>2007</b>               | <b>2008</b> | <b>2009</b> |
| Food retailers   | 2769.0              | 2943.9            | 3123.4                 | 3300.2                    | 3480.0      | 3682.9      |
| Non-Food retailers   | 5773.6              | 6040.0            | 6332.2                 | 6666.3                    | 7055.5      | 7482.1      |
| Total  | 8542.6              | 8983.6            | 9455.6                 | 9966.5                    | 10534.4     | 11165.0     |
| <b>Organised Retail outlet Projection for 2015(Outlet wise) **</b> |                     |                   |                        |                           |             |             |
| <b>Hyper Market</b>  | <b>Super Market</b> | <b>Mega Store</b> | <b>Specialty Store</b> | <b>Departmental store</b> |             |             |
| 200  | 280                 | 400               | 1200                   | 20000                     |             |             |

\* Only 4 per cent of the outlets occupy an area of more than 500 sq. ft

\*\* Growth is 20 per cent annually

Source: Chengappa et al. (2009)

Although specialty stores are gaining popularity in India, malls comprise of 90 percent of the total future retail development. Mall format is expected to grow at the rate of 35-40 percent per annum for the next five years. Industry experts believe that as customers get used to retail culture, mall format will grow at a phenomenon pace. Most of the metro cities (Mumbai, New Delhi, Bangalore, and Chennai) with a population of over two million have good potential for setting up malls. A significant trend in the market is the development of a combination of retail and entertainment centres. While number of shopping malls has seen a spurt in the recent past, future development is now increasingly being focused on providing for leisure activities as well.

### 3 VEGETABLE RETAIL IN INDIA

Indian vegetable retail is predominantly occupied by the traditional retailers for years that are small in operational volume. Traditional Indian retailers account for 12 million retail outlets all over the country and more than 40 percent of them sell vegetable and grocery (IBEF, 2008). Indian food retail consists of staple commodities comprising grains, pulses and vegetables. Indian food retail, especially vegetable retailing is witnessing a rapidly growth in India's organized retail sectors. The traditionally retailing of vegetables is not very much organized which amounts to 97% of the total market (*Ernst & Young, 2006*), extremely localized and highly fragmented with large number of intermediaries. The intermediaries between the customers and farmers are traditional retailers with different outlet formats – mom and pop shop, non permanent shops in the market, pavement vendors, road side vendors and push cart vegetable sellers, wholesale traders, commission agents and auctioneers.

The farmers themselves sell their produces directly to the end consumers as sellers in local markets, regulated and unregulated 'Farmers markets', sell to intermediaries – agents and organized retailers. The market place is in close proximity to their farmland and customers accessing the market are in a closer distances. Farmers selling vegetables directly to the customer is amount to very small fraction by volume. Farmers sell bulk of their produces to agents and auctioneers. The agents buy even small quantities of produces from farmers and transfer it to wholesalers directly or through another agent. The auctioneers are those who have entered into buying contract with farmers for whole or partial quantity of the produces and sell the produce to an agent or a wholesaler. Auctioneers also transfer the vegetables to wholesalers directly or through another agent. Wholesalers of vegetables sell to retailers, both traditional and organized retailers and to customers, who buy in large quantity. Cart vendors, a type of tradition retailers, buy in vegetables from wholesalers or organized retailers, sell to customers in mobile carts and deliver to customers at customer's door steps.

India, though with a population of a billion and a middle class population of over 300 millions, organized retailing (in the form of vegetable retail chains) is still in its infancy in the Country. India has been rather slow in joining the organized retail revolution that was rapidly transforming the economies in the other Asian countries. Amidst the inefficient traditional vegetable supply chains, the emergence of supermarkets may open an alternative avenue through which vegetables can move from the producer to the consumer. Organised retail in India, with better supply chain management, will not only lower wastage but also curtail other

supply chain costs. With fewer middlemen, costs and commissions can decline up to 1.68 times the farm prices (even if retailers maintain current mark-up levels).

Wastage of vegetable in the traditional channel is 40 per cent by volume and Storage and commissions cost 47 per cent of retail price (JAJU, 2007). Historically, Indian consumers have preferred fresh food, and they have not tended to put a high priority on convenience and speed when purchasing and preparing the evening meal (PYSARCHIK; CHUNG; PLANK, 1999) and due to the cultural and personal attitudes of Indian consumers about food and the perceived importance of “fresh” food (LING; CHOO; PYSARCHIK, 2004).

Organised and traditional retailers in developing countries also compete on convenience, specifically for vegetables and grocery purchases. The convenience includes the distance of the store from the home, the number of trips needed to get all the items, the variety of items available at a given store, the hours of the store and thus the ability of the consumer to minimize the opportunity cost of a trip to the store. Traditional retailer’s shops are in the consumer’s residential localities and organised retailers are not penetrated. Small shops and vegetable retailers have used the advantage of their location in inner cities, their offering of fresh foods, and personalized service to compete on convenience. The upshot is that, just as in developed countries, store location and hours have been key battle grounds (REARDON; BERDEGUÉ, 2006).

Researchers attempted to predict the possibility of customers switching from traditional stores to organized retailers while shopping for vegetable purchase. Selection and preference of shop for vegetable purchase has two aspects, first discern factors related to store patronage; and secondly, identify the dimensions of customers’ needs and desires which are relevant for grocery store choice. As far as retail store patronage is concerned, though early studies (ENIS; PAUL 1970; DUNN; WRIGLEY, 1984) found loyalty to be a characteristic of poorer shoppers, a recent study indicates significantly higher incomes and weekly expenditures of the loyal shoppers (MCGOLDRICK; ANDRE 1997).

Product selection, assortment and courtesy of personnel are also very important in determining format choice and cleanliness is the most important attribute regardless of the format of retail store. Consumers are not able to perceive an important difference between home delivery and traditional vegetable shopping. An important factor that has an impact on vegetable shopping behaviour is unplanned buying. The major drivers for choosing a vegetable store in India seem to be nearness to place of residence and the comfort level that

the respondents has in dealing with the store owner (measured in terms of personal relationship with the shopkeeper).

Hence there is difference in the results of the studies of different authors as far as relative importance of attributes are concerned, which might be attributed to either changes in consumers over a period of time or to the place of study as vegetable shopping patterns vary with culture. In an age of increasing competition in vegetable retailing from organized vegetable retailers, local shops need to have the commitment and willingness to cater for the local community for survival, which means focusing attention more closely on local residents' wants and needs. Local shops are seen to provide a vital social and community function, particularly for those undertaking their main shopping locally.

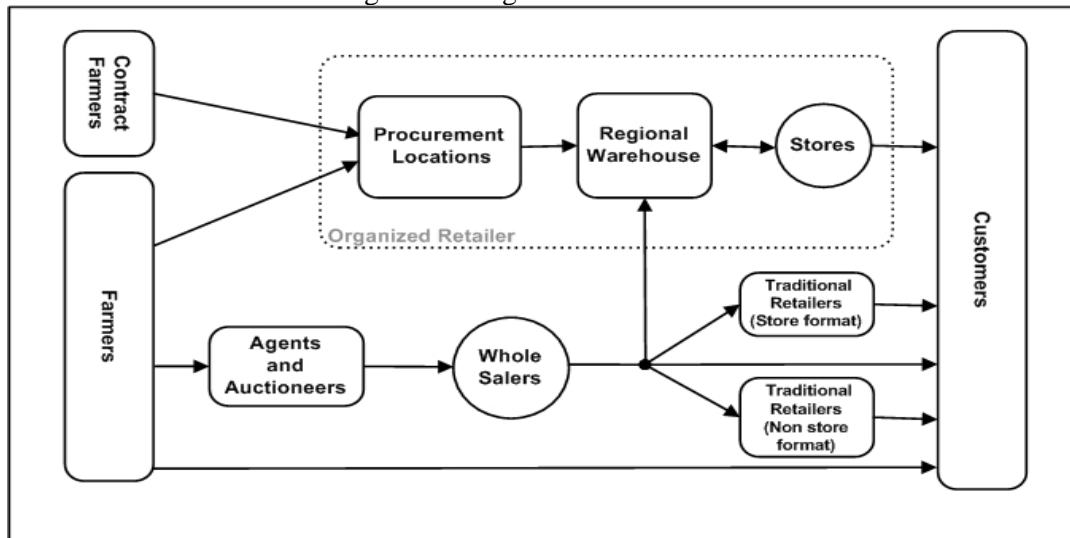
### **3.1.1 Vegetable Retail Model**

Organised retailers including prominent players like Spencer's Retail, More (Trinethra Super Retail Ltd.) and Food Bazaar (Pantaloon Retail (India) Ltd) are adopting a business model of retail vegetables marketing. Figure 1 illustrates the business model of retail vegetable marketing. Fewer players are involved in this model compare to traditional retailing model. Farmers, organised retailers and customers form this chain.

Buying centres, hub and stores (retail outlets) are operational units of organised retailers. Small farmers and contract farmers those who executed a trade contract with the organised retailers are the primary source of supply of vegetables to organised retailers. Buying centres make vegetable purchases directly from farmers and transport to hubs. Hub is served by one or more buying centre and buying centre serves one or more hubs. Hub infrequently buys small volume of vegetables from the local wholesale market to balance demand supply gap. Hub distributes vegetables to stores attached to it. Store is served by only one hub. Stores sell vegetable in retail quantity to customers. Vegetables travel from farmers to organised retailer's buying centres, buying centre to hubs, from hub to retail stores and retail outlet to customer. Farmers transport vegetables from farming location to buying centres. Transport of vegetables in the second phase of the transport, from buying centres to hub is arranged by buying centre.



Figure 1 – Vegetable Retail Model



Source: Authors

Mode of transport is unconditioned (not temperature controlled) trucks. Fresh vegetables are transported in the third phase, from hub to stores and collected stores return of shelf life expiring vegetables from stores to hub. The shelf life expired vegetables are sold to cart vendor. Customers buy and pick up vegetables from the organised retail stores. Stores offer home delivery for a shorter coverage area and high value of purchases. Vegetables are handled in stackable plastic crates and corrugated boxes. Loading and unloading are carried out manually. Vegetables are cleaned and washed at the hub on arrival. Sorting and grading is done at the hub without packaging. At hubs, space available for temperature controlled storage is very less, but warehousing is used for it. Information technology and advanced management techniques are deployed partially. Connectivity between hub and corporate office has been established.

Stores are entity of organised retailer and located across cities and metros. These stores are the point of contact with the customers. Vegetables are part of their assortments in supermarket format also. Handling of vegetables in-store is manual and in standard crates. No conditioned (temperature controlled) storage facility is available with stores as all vegetables are displayed but the entire store is in temperature-controlled condition. Sale at stores is across the counter and no customer orders are registered. The regional warehouse is the only source of supply for stores. Stores forecast and indicate the requirements to the regional warehouse. Stores have point of sale (POS) and computer systems. These systems currently are stand-alone and retailers are in the process of establishing connectivity with other entities of the organisation.

## **4 RESEARCH METHOD**

Purpose of the study is to understand the impact of organised vegetable retailers on all players (producers, intermediaries, traditional retailers and consumers) in the prevailing vegetable retailing. Purpose is to understand the positive (or benefits) or negative (or disadvantages) impacts of organised vegetable retailers on players of current vegetable market. Research treats all players as homogenous categories and adopts different instruments. To find answers to research questions, objectives are framed which involved collection and analysis of both primary and secondary data of vegetable retail in the state of Tamil Nadu with customer focus on the city of Chennai. Objectives of this study is to understand the factors contributing towards consumers' preference in selection of vegetable retailers.

### **4.1 Research Techniques**

Primary data collected for the purpose of analysis is checked, coded, classified, and tabulated by following the statistical producers and system dynamics simulation. Analysis and interpretations of primary data is based on the tabulated data and with the help of following techniques and software:

- Confirmatory factor analysis on the variables to confirm the factors influencing the preference of selection of vegetable retailers by consumers.
- System Dynamics modelling simulation to understand the effect of various factors in selection of retailers (Vensim PLE for system dynamics simulation modelling).

### **4.2 Factor analysis**

Attributes on vegetable retailing are used for factor analysis to reduce the data to meaningful factors. For this purpose, principal components analysis is used with Varimax rotation. The resultant factors are identified using 'eigen' value greater than one criterion. As a general rule, for factor analysis, the minimum is to have at least five times as many observations as there are variables (HAIR et al., 2006). So the sample size of 612 was adequate and within acceptable limits. Instead of using factor scores, items, which loaded highly on a factor, are averaged for subsequent analyses. This method is supported by Hair et al. (2006) to analyse and interpret the results rather than use factor scores which is basically the linear combination of all the variables and not simply the variables which load highly on a specific factor.

Table 2 – Confirmatory factor analysis

| No                         | Variable              | No of Items | RMSEA       | CFI          |
|----------------------------|-----------------------|-------------|-------------|--------------|
| <b>Critical Dimensions</b> |                       |             |             |              |
| 1                          | Location              | 4           | 0.25        | <b>0.767</b> |
| 2                          | Physical              | 4           | 0.07        | <b>0.984</b> |
| 3                          | Price and Measurement | 4           | 0.25        | <b>0.734</b> |
| 4                          | Product               | 7           | 0.24        | <b>0.890</b> |
| 5                          | Hedonistic            | 3           | 0.07        | <b>0.982</b> |
| 6                          | Service               | 6           | 0.20        | <b>0.963</b> |
| 7                          | Social                | 4           | 0.15        | <b>0.904</b> |
| <b>Outcome</b>             |                       |             |             |              |
| 8                          | Satisfaction          | 7           | 0.34        | <b>0.957</b> |
| 9                          | <b>Preference</b>     | <b>7</b>    | <b>0.15</b> | <b>0.998</b> |

Source: Authors

For unidimensionality checking, a measurement model is specified for each construct and CFA is run for all the constructs. Individual items in the model are investigated to see how closely they represent the same construct. Comparative Fit Index (CFI) is equal to the discrepancy function adjusted for sample size. CFI range from 0 and 1, with a large indicating better value fit. Recommended values of CFI are 0.9 and above (Very good fit) 0.8 and above (Good fit) and 0.7 and above (Satisfactory fit) (HU; BENTLER, 1999).

Root Mean Square Error of approximation (RMSEA) is related to the residual in the model. RMSEA values range from 0 to 1, with a smaller value indicating a better model fit. Comparative fit indices measure the improvement of fit by comparing the hypothesised model with more restricted baseline model. The baseline model commonly used is a null or independent model where the observed variables, with variances to be estimated, are mutually uncorrelated. The model fit information obtained from these fit indices is very different from that obtained from the  $\chi^2$  (Chi square) measure where a hypothesised model is compared to a saturated model. The comparative Fit Index for the dimensions, physical (0.984), hedonistic (0.982), service (0.963) and social (0.904) exhibit very good fit; dimension product (0.890) shows good fit and dimensions location (0.767) and price and measurement (0.734) demonstrate satisfactory fit. Since all the CFI value in the Table 2 are above 0.7, denoted a satisfactory unidimensionality for the scales.

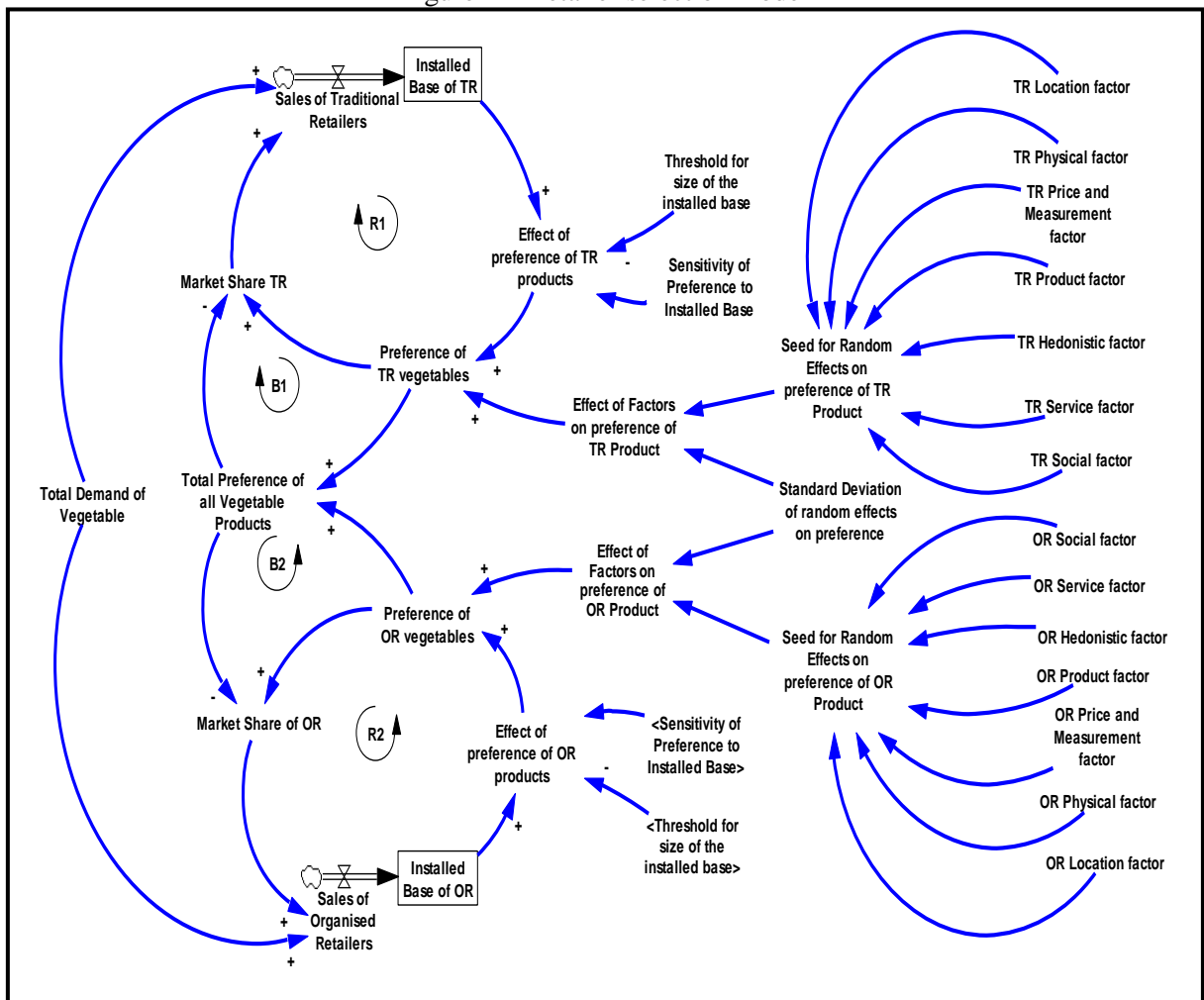
### 4.3 System Dynamics

Effect of preference of either traditional vegetable retailer or organised vegetable retailer is seeded by different factors. The factors are location, physical, price and measurements, product, hedonistic, service and social. These factors are derived from critical measurements which are listed in Table 2 and converged into above said factors. Effect of

preference of vegetable retail products, preference of retailer, market share of traditional retailers or share of organised retailers, sale of organised or traditional retailers are in reinforcement loop. Installed base of retailers area based on the rate of sales of retailers, total share of vegetable products, market share of organised retailers or traditional retailers are in balancing loop.

Vensim PLE software is used for system dynamics modelling. Selection of retail vegetable vendor is mapped into Vensim PLE software package. This simulation software helps companies to find an optimal solution for various situations that need analysis and where it's necessary to find out all possible results of future implementation or decision. Vensim is used for developing system dynamics feedback models which includes the features of dynamic functions, subscripting (arrays), sensitivity analysis, and data handling. Structure for a simple model of network effect (STERMAN, 2000) referenced in developing vegetable retailer selection.

Figure 2 – Retailer selection model



Source: Authors

### 4.3.1 Simulation scenarios

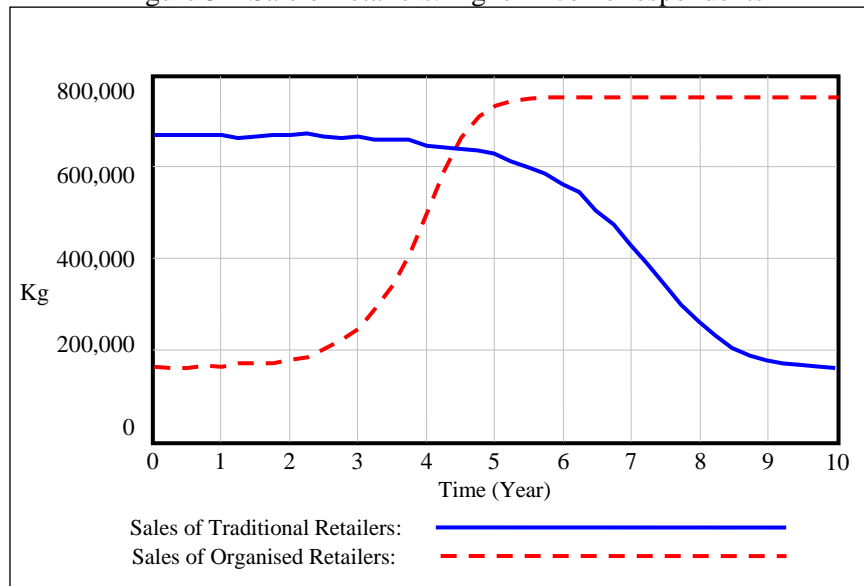
Status quo of current market trend, customer choice and preferences are the scenario in ‘Current or existing market condition’. Values for individual variables are listed in Table 3. Figures 2 is there presentation of sale of traditional retailers and organised retailers in the simulated scenario.

Table 3 – Seed values of simulation

| Variable Name                   | Value |
|---------------------------------|-------|
| TR Hedonistic factor            | 2.71  |
| TR Location factor              | 4.28  |
| TR Physical factor              | 2.82  |
| TR Price and Measurement factor | 4.14  |
| TR Product factor               | 3.88  |
| TR Service factor               | 3.48  |
| TR Social factor                | 3.53  |
| OR Hedonistic factor            | 3.88  |
| OR Location factor              | 2.53  |
| OR Physical factor              | 3.76  |
| OR Price and Measurement factor | 2.80  |
| OR Product factor               | 3.79  |
| OR Service factor               | 3.11  |
| OR Social factor                | 2.33  |

Simulation carried out with the technique of marginal analysis with the seven parameters of traditional retailers. The installation base and all other seed variables of the organised retailers are assumed to be constant and equal to the existing market conditions.

Figure 3 – Sale of retailers: higher income respondents



The Figure 3 clearly indicate that the sale of traditional retailers starts declining from fourth year onwards and after ninth year it sustains its sales or rate of decline at a reduced

level. In contrary to that the sales of organised retailers makes an uptrend from third year onwards and continue till fifth year.

## 5 CONCLUSION

Simulation results reveal essential behavioural features and disclose the indicative time frame for emerging organised market of vegetable retail in India. In contrast, the variation in consumer's preferential factors influenced more significantly than the total vegetable demand variation. Result suggests form scenarios that the retailers preference is affected not only by consumer's change in choice but also by the rate of penetration of organised retailers in to traditional retailers market space and traditional retailers sustainability in market.

The spread of modern retailers will aid decline of the traditional retail sector in substantial part due to competition with modern retailers. The fastest decline in the traditional sector is small general stores selling broad lines and processed foods and dairy products, while fresh produce shops and wet markets hold out longer. Additionally, because of complexity of government policy decisions, infrastructural developments, investment rate of organised retailers in the vegetable retailing, and optimised strategies of organised retailer and preparedness of traditional retailers to counter the competition from organised retailers will change the ground reality and assumption made in the simulation.

Traditional as well as organised retailers have certain positive as well as negative aspects that attract or repulse consumers. Major aspects that have come out in this study is that organised retailer is preferred for their cleanliness, promotional offers, exclusive store brands, whereas traditional retailers are preferred because of their location and price of vegetables. The analysis also shows that organised retailers score better over traditional retailers, which is indicative that consumers' need for better attributes in terms of their demand. Other positive impacts of the rise of organised retailers in vegetable markets are increase employment in modern retailer outlets and in their dedicated supply chains, a general improvement of food quality throughout the country and consumers increasingly take better value for shopping, reduction in consumer retail prices which will benefit consumers. This means that traditional retailers are facing threat from organised retailers in terms of providing the matching attributes and shopping experience.

Location being one of the primary deciding factors for vegetable purchase, traditional retailers presently have an advantage, but large business houses coming into foray by opening stores in residential areas like the small-box retailers, this advantage seems to be short lived.

Other impacts of the rise of organised retailers in vegetable market are possibility of elimination of Intermediaries and chances of forcing small traditional retailers out of business. The results indicate that it is inevitable that there should be a modernisation of commerce. In order to do so, first of all traditional retailers will have to make a realistic and critical examination of their potentialities, as well as of their vulnerabilities.

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